NOTES ON THE GENUS *CLERODENDRUM* (*VERBENACEAE*). XX

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CLERODENDRUM HOLTZEI F. Muell.

Additional bibliography: Mold., Phytologia 60: 200. 1986.

Continuation of description of the species: "style glabrous, almost totally enclosed; fruit shorter than the calyx; pericarp thin, somewhat succulent; endosperm thinly osseous, often only one of the nutlets perfect. In clefts of rocks, the comparatively long carnulent root deeply penetrating. Stems seemingly but slightly woody, often only a foot long even when flowering, slender. Leaves mostly measuring 1--1½ inches, exceptionally somewhat indented, never pointed. Calyx occasionally 6 cleft. Corolla measuring ½--2/3 inch in length. Nutlets ¼--1/3 inch long, when solitary verging into a globular form. Testa pale. Cotyledons white, turgid; radicle very short. This species is as regards its flowers not unlike *C. tomentosum* but the stamens are shorter, and the leaves as well as the stature and the fruit are widely different; in size of the leaves it comes near to *C. phlomoides*."

Citations: AUSTRALIA: Northern Territory: *Holtze 109* [Herb. Prager 18685] (Ca--isotype, Gg--32012--isotype, L--isotype).

CLERODENDRUM HORSFIELDII Miq., Fl. Ind. Bat. 2: 880--881 [as "*Clerodendron*"]. 1858; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 64 & 90. 1942.

Synonymy: *Clerodendron horsfieldii* Miq., Fl. Ind. Bat. 2: 880--881. 1858. *Clerodendron blumeanum* var. *horsfieldii* (Miq.) Kuntze, in herb.

Bibliography: Miq., Fl. Ind. Bat. 2: 880--881. 1858; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 561. 1893; Koord. & Valet., Meded. Lands Plant. Bat. 42 [Beijdr. Booms. Java 7]: 212. 1900; Koord, Exkursionsfl. 3: 138. 1912; H. J. Lam, Verbenac. Malay. Arch. 304 & 363. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 92, 109, & ix. 1921; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 64 & 90. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 561. 1946; H. N. & A. L. Mold., Pl. Life 2: 65. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 144 & 181. 1949; Synge in Chittenden, Roy. Hort. Soc. Dict. Gard., ed. 2, 1: 505. 1956; Mold., Resumé 190, 264, & 450. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 561. 1960; Mold., Fifth Summ. 1: 322 & 446 (1971) and 2: 866. 1971; Mold., Phytol. Mem. 2: 313 & 537. 1980; H. N. & A. L. Mold. in Dassan. & Fosb., Rev. Handb. Fl. Ceyl. 4: 446. 1983; Mold., Phytologia 58: 196, 197, 287, & 291 (1985) and 59: 331. 1986.

Miquel's original (1858) description of this plant is "Ramuli obtuse subcompresso-tetragoni petiolique cum folii paginâ sup. et inflorescentiâ puberuli. folia opposita aequalia vel inaequalia longe (6--3 poll.) petiolata, e basi lato-cordatâ vel subconcavâ rotundato-ovata acuminata repando-obtuse subcalloso-denticulata, subcoriacea, subtus molliter breviterque cana et raris glandulis peltatis

inspersa alte trinervia et pauci-costata transverseque venosa, 7--2 poll. longa, cymae longe pedunculatae in thyrsum corymbosum parvi-paucique foliatum collectae, singulae vulgo 7--4-florae, calycis puberuli colorati (in sicco coccinei) campanulati sub anthesi semi-pollice parum brevioris 5-fidi laciniae elliptico-oblongae acutatae pauci-glandulosae, corollae extus tenuissime puberae tubus pollicaris calyce circiter triplo longior, limbi 5-partiti laciniae obovato-oblongae subspathulatae 6--5 lin longae unilaterae, staminibus paullo breviores, stigmatis crura acuta inaequalis. Java, op den G. Praoe (Horsf.). -- Kembang geni sund."

A key to distinguish this species from its relatives in cultivation in English gardens, as given (with modifications) by Synge (1956), may be found under *C. bethunianum* Low in the present series of notes (58: 197).

Material of this species has been misidentified and distributed in some herbaria as *C. speciosissimum* Van Geert. On the other hand, the *Ploem 155*, distributed as *C. horsfieldii*, actually is *C. disparifolium* Blume.

Citations: GREATER SUNDA ISLANDS: Java: *Backer 30604* (Bz--20512, Bz--20513, Bz--20514); *Horsfield s.n.* (Ld--photo of type, N--photo of type, Ut--49915--type).

CLERODENDRUM HUMBERTI Mold., Phytologia 3: 307--308. 1950.

Synonymy: *Clerodendrum humbertii* Moldenke apud Fosb., Kew Bull. 33: 143. 1978.

Biblicgraphy: Mold., Phytologia 3: 307--308. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 56. 1953; Mold. in Humbert, Fl. Madag. 174: 150, 187. 191, & 267, fig. 30 (12 & 13). 1956; Mold., Résumé 155 & 450. 1959; Mold., Fifth Summ. 1: 260 (1971) and 2: 866. 1971; Fosb., Kew Bull. 33: 143. 1978; Mold., Phytol. Mem. 2: 249 & 537. 1980; Mold., Phytologia 58: 187 (1985) abd 59: 497. 1986.

Illustrations: Mold. in Humbert, Fl. Madag. 174: 187, fig. 30 (12 & 13). 1956.

A twiggy shrub, about 1 m. tall; branches, branchlets, and twigs numerous, slender, light-gray or whitish, subterete, densely white-strigose with short, closely appressed, antrorse hairs, the branches less densely strigose in age, finally glabrescent on old wood; nodes not annulate; principal internodes 1.3--4 cm. long; leaves very small, decussate-opposite, regular, apparently quite uniform; petioles filiform, 2--6 mm. long, rather densely appressed-strigillose with whitish hairs; leaf-blades firmly chartaceous, perhaps somewhat fleshy when fresh, uniformly bright-green on both surfaces or slightly lighter beneath, orbicular, 5--13 mm. long and wide, apically rounded or emarginate, marginally entire, basally rounded or truncate, glabrous on both surfaces, very densely impressed-punctate on both surfaces, the midrib and approximately 4 secondaries filiform, very tenuous, indiscernible on both surfaces or very obscure beneath; veinlet reticulation indiscernible on both surfaces; inflorescence terminal and in the uppermost leaf-axils, small. cymose, the individual cymes lax, 1.5--3 cm. long and wide, rather few-flowered; peduncles very slender, very densely white-strigose like the twigs,

6--10 mm. long; pedicels filiform, 3.5--6 mm. long, scattered-strigillose with white hairs; calyx campanulate, about 2 mm. long and wide, very sparsely scattered-strigillose with very short white hairs, the rim very shallowly and obscurely 5-toothed or subtruncate; corolla hypocrateriform, pale greenish-white or white, the tube about 5 mm. long, externally puberulent, the limb about 5 mm. wide; stamens and pistil long-exserted, the latter about 11 mm. long, glabrous; stigma bifid.

This endemic species is based on *Humbert & Swingle 5623* from the neighborhood of Ambovombe, at 1--50 m. altitude, in the extreme south of Madagascar, collected on September 9, 1928, and deposited in the United States National Herbarium in Washington.

Fosberg (1978) suggests that this species may "represent" *C. glabrum* E. Mey. in Madagascar, "which seems similar in many respects".

Collectors have encountered *C. humberti* in sand along roadsides and in *Didierea* bushland, at 1--50 m. altitude, in flower in May, July, September, and November. The corollas are described as having been "white" on *Decary 2690, 2771, 9077,* & *9169* and *Lam & Meeuse 5488.*

A key to distinguish this species from its Madagascar relatives will be found under *C. baronianum* Oliv. in the present series of notes (58: 184--190).

Citations: MADAGASCAR: *Decary 2690* (P), *2771* (N, P), *9077* (P), *9169* (P); *Humbert & Swingle 5623* (A--isotype, F--photo of type, It--photo of type, Ld--photo of type, N--fragment of type, N--photo of type, P--isotype, W--1528818--type); *Lam & Meeuse 5488* (Le--939171-384, N).

CLERODENDRUM HUMILE Chiov., Nuov. Giorn. Bot. Ital., ser. 2, 29: 117 [as "*Clerodendron*"]. 1923; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 64 & 93. 1936.

Synonymy: *Clerodendron humile* Chiov., Nuov. Giorn. Bot. Ital., ser. 2, 29: 117. 1923.

Bibliography: Chiov., Nuov. Giorn. Bot. Ital., ser. 2, 29: 117. 1923; A. W. Hill, Ind. Kew. Suppl. 7: 51. 1929; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 37, 64, & 93. 1936; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 48 & 90 (1942) and ed. 2, 115 & 181. 1949; Mold., Resumé 141 & 450. 1959; Mold., Fifth Summ. 1: 228 (1971) and 2: 866. 1971; Mold., Phytol. Mem. 2: 218 & 538. 1980.

This species is based on an unnumbered Bovone collection from the Katanga Plateau of the Bionos, Zaire, collected on October 19 (year?) and according to Thomas (1936) the plant is only 12--15 cm. tall, the leaves at most 5 cm. long and 2.5 cm. wide, and the corolla-tube about 5 cm. long. He comments that "Diese Art ist mir nur aus der Beschreibung bekannt; danach dürfte sie mit *C. Buchneri* identisch sein, von der sie ein zufällig sehr kleines Exemplar darstellt; sie unterscheidet sich lediglich durch die Grössenverhältnisse". In his key to species he distinguishes *C. buchneri* from it by the fact that in *C. buchneri* the plants are to 60 cm. tall and the corolla-tubes about 9 cm. long.

Nothing is known to me of *C. humile* beyond what is stated in its

meager bibliography (above).

CLERODENDRUM IMPENSUM Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 100. 1936.

Bibliography: B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 7, 38, 66, 94, & 100. 1936; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 49 & 90. 1942; Hill & Salisb., Ind. Kew. Suppl. 10: 55. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 116, 118, & 181. 1949; Mold., Résumé 144 & 450. 1959; Mold., Fifth Summ. 1: 235 (1971) and 2: 866. 1971; Mold., Phytol. Mem. 2: 225 & 538. 1980.

A shrub, 1--2 m. tall; branchlets obtusely tetragonal, dark rusty-red, hollow, puberulent or hispidulous, with accessory buds; leaves decussate-opposite; petioles 0.5--2 cm. long, hispidulous ["vel cuspidato" fide Thomas, =hispid?], striate; leaf-blades coriaceous, elliptic-oblong, 6--9 cm. long, 4--5 cm. wide, apically acute, marginally coarsely and irregularly dentate or undulate, basally attenuate, glabrous above or sparsely pilose on the immersed venation, prominently "cuspidata" [fide Thomas, =hispid?] on the venation beneath; inflorescence capitate, few-flowered, borne in the axils of small leaves or foliaceous bracts and aggregate at the tips of the branchlets; peduncles very short; pedicels very short; bracts rotund-elliptic or lanceolate-elliptic, 0.6--2 cm. long, 0.3--1.5 cm. wide, apically acute, conspicuously venose, glabrous, marginally ciliate, probably colored; calyx probably violet in color, cupuliform-campanulate, 3 mm. long and about equally wide, basally sparsely hispid; corolla white, the tube slender, about 3.5 cm. long, curved, glandulose, basally and apically slightly dilated, the lobes 5, subequal, ovate-oblong, about 6 mm. long, reclinate; stamens long-exserted, the filaments didynamous, 5.5 and 6 cm. long, inserted below the mouth of the corolla-tube, surpassing the pistil; anthers 1.5 mm. long; style 5.6 cm. long; stigma shortly bifid; fruiting-calyx about 1 cm. long, wide-spreading, split to 4/5 its length into 5 ovate-triangular teeth which are basally 4 mm. wide, apically acute, marginally ciliate, and conspicuously venose; mature fruit unknown.

This species is based on *Eick 396* from an abandoned cultivated area at Usambara, Kwai, Tanganyika, collected on October 22, 1899, and deposited in the Berlin herbarium, now probably destroyed. Thomas (1936) cites also *Albers 248* and *Engler 1175* from the same locality in Tanganyika, the altitude there given as 1500--1600 m.

Nothing further is known to me of this species.

CLERODENDRUM IMPENSUM var. *BUCHNEROIDES* Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 66. 1936.

Bibliography: B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 66. 1936; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 49 & 90 (1942) and ed. 2, 116 & 181. 1949; Mold., Résumé 144 & 450. 1959; Mold., Fifth Summ. 1: 235 (1971) and 2: 866. 1971; Mold., Phytol. Mem. 2: 225 & 538. 1980.

This variety differs from the typical form of the species in being more or less strongly hairy throughout, the stems green, and the leaf-blades oblong.

The variety is based on *Braun 5397* from Tabora, Tanganyika, collected on June 4, 1913, and deposited in the Berlin herbarium, now probably destroyed. Thomas (1936) cites also *Meyer 1115* from Ussimbiro, Tanganyika, collected in 1911.

Citations: TANZANIA: Tanganyika: *Burtt 4889* (Ld--photo, N--fragment, N--photo, S).

CLERODENDRUM INAEQUIPETIOLATUM Good in Good & Exell, Journ. Bot. Brit. 68: Suppl. 2: 141--142 [as "*Clerodendron*"]. 1930; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 75 & 94. 1936.

Synonymy: *Clerodendron inaequipetiolatum* Good in Good & Exell, Journ. Bot. Brit. 68: Suppl. 2: 141. 1930.

Bibliography: Good in Good & Exell, Journ. Bot. Brit. 68: Suppl. 2: 141--142. 1930; A. W. Hill. Ind. Kew. Suppl. 8: 54. 1933; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 42, 75, & 94. 1936; Fedde & Schust., Justs Bot. Jahresber. 58 (2): 329. 1938; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 47, 50, & 90 (1942) and ed. 2, 113, 118, & 181. 1949; Mold., Résumé 139, 146, & 450. 1959; H. Huber in Hutch. & Dalz., Fl. W. Trop. Afr., ed. 2, 441 & 444. 1963; Mold., Fifth Summ. 1: 223 & 242 (1971) and 2: 867. 1971; Mold., Phytol. Mem. 2: 214, 132, & 538. 1980.

A yellowish- or yellowish-brown-hirsute scrambling shrub, about 3 m. tall; branches terete, densely hirsute especially on the nodes; leaves decussate-opposite; petioles to 5 cm. long, one of each pair longer than the other; leaf-blades obovate, to 18 cm. long and 12 cm. wide, one of each pair somewhat larger than the other, apically acute and mucronate, marginally sparsely subdentate, basally cordate, olivaceous and hispid above, the venation pubescent, paler beneath and the venation there also pubescent; secondaries about 7 pairs; tertiaries transverse; inflorescence corymbose, terminal, densely subcapitate; pedicels short, about 3 mm. long; bractlets filiform; calyx 5--6 mm. long, externally yellow-hirsute, the tube infundibular, 5-lobed, the lobes lanceolate-triangular, 2--3 mm. long, shorter than the tube, apically acute, ventrally glabrous; corolla white, the tube 8--9 mm. long, slightly longer than the calyx, glabrous on both surfaces, slightly constricted at the middle, the limb 5-lobed, the lobes ovate-suborbicular, spreading, 4--5 mm. long, about half as long as the tube, dorsally densely long-hirsute; stamens long-exserted; filaments filiform, about 0.8 mm. long, equaling the corolla-tube, glabrous; anthers oval, apically obtuse; style filiform, 10 mm. long, surpassing the corolla-tube, glabrous; ovary externally glabrous; fruit about the size and shape of a pea, glabrous.

This species is based on *Gossweiler 7384* from the borders of woods near Fort Quisseque, Cuanza District, Angola, collected in flower and immature fruit on January 13, 1918, and deposited in the herbarium of the British Museum (Natural History). Good (1930) comments: "Very nearly related to *C. Johnstonii* Oliv., but the flowers are smaller than in that species and this hirsute pubescence is quite distinct from its soft woolly tomentum". Huber (1963), however, says of *C. inaequipetiolatum*: "similar and closely akin to *C. sinuatum* [Hook.]"

Thomas (1936) cites the type collection and then notes that

"Diese Art ist mir nur aus der Beschreibung bekannt; danach müssten die beiden folgenden Nummern ihr zuzurechnen sein" -- *Gossweiler 9487* from Angola and *Ledermann 5438* from Cameroons. Huber (1963) cites *Savory UCI.305* and *Ujer FHI.30489* from the Cameroons. He distinguishes the present species from some of its small-flowered, mostly opposite-leaved relatives in western tropical Africa as follows (with his key somewhat modified by me):

1. Calyx 5 mm. long or longer; leaves glabrous.....C. *buchholzii*.
1a. Calyx less than 5 mm. long, or, if longer, then the leaves markedly pilose.
2. Calyx-lobes as broad as or broader than long, usually spreading; pedicels mostly more than 5 mm. long; leaves glabrous.
3. Whole plant nigrescent when dry; petioles more than 3 cm. long.....C. *melanocrater*.
3a. Plant not nigrescent; petioles only up to 2 cm. long.
4. Branches puberulent; inflorescence elongate; rachis internodes usually 2 cm. or more long; corolla-tube 2 mm. or more wide, densely pilose.....C. *thyrsoideum*.
4a. Branches glabrous; inflorescence short; rachis internodes less than 1 cm. long; corolla-tube less than 1 mm. wide, subglabrous.....C. *volubile*.
2a. Calyx-lobes longer than broad, mostly erect; pedicels usually less than 5 mm. long; leaves usually pilose, especially on the venation beneath.
5. Calyx pubescent, 5--7 mm. long; leaves always opposite, broadly ovate, pubescent on both surfaces.C.*inaequipetiolatum*
5a. Calyx only minutely puberulent to subglabrous, 2--4 mm. long; leaves sometimes ternate, elliptic to ovate, glabrous above or slightly pubescent only on the midrib, pubescent only on the venation beneath.....C. *dusenii*.

Citations: ANGOLA: Cuanza: *Gossweiler 7384* [Mo. Bot. Gard. type photo A.88?] (Go--photo of type, Ld--photo of type, N--photo of type, W--photo of type). Loanda: *Gossweiler 9487* (Ld, W--1550238).

CLERODENDRUM INCISUM Klotzsch in Peters, Reise Mossamb. Bot. 1: 257--258 [as "*Clerodendron*"]. 1861; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.]. 78. 1936.

Synonymy: *Clerodendron incisum* Klotzsch in Peters, Reise Mossamb. Bot. 1: 257. 1861. *Clerodendron lindemuthianum* Vatke, Linnaea 43: 537--538. 1882. *Clerodendron bernieri* Briq., Bull. Herb. Boiss. 4: 348--349. 1896. *Clerodendron incisum* var. *typica* Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 79. 1921. *Clerodendrum incisum* var. *typica* Bakh. apud B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 78 in syn. 1936. *Clerodendrum incisum* Baker ex Mold., Résumé 272 in syn. 1959. *Clerodendrum incisum* Vent. ex Mold., Resumé 272 in syn. 1959. *Clerodendrum incisum* var. *typicum* Bakh. apud Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 799 in syn. 1962.

Bibliography: Klotzsch in Peters, Reise Mossamb. 6 [Bot. 1]: 257-258. 1861; Bocq., Adansonia, ser. 1, 2: 159. 1862; Vatke, Linnaea 43: 537--538. 1882; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 561. 1893; Gürke in Engl., Pflanzenw. Ost-Afr. C: 341. 1895;

Briq., Bull. Herb. Boiss. 4: 348--349. 1896; J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 294 & 307--308. 1900; Koord. & Valet., Med-ed. Lands Plant. Bat. 42 [Beijdr. Booms. Java]: 164. 1900; Backer, Tropische Natuur 5: 87. 1916; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 74, 79, 109, & ix. 1921; Beumee, Tropische Natuur 17: 176. 1928; Chiov., Fl. Somal. 2: 364, fig. 208. 1932; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1072. 1932; Burkill, Dict. Econ. Prod. Malay Penins., imp. 1, 1: 589. 1935; Patermann, Zytol. Untersuch. Verbenac. 36--38, [55], & [56], pl. 4, fig. 39, & pl. 5, fig. 1. 1935; Schimp. & Faber, Pflanzen-Geog., ed. 3, 1: 393. 1935; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 43, 78, & 94. 1936; Mold., Geogr. Distrib. Avicenn. 37. 1939; Mold., Prelim. Alph. List Inv. Names 20 & 21. 1940; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 571. 1941; Worsdell, Ind. Lond. Suppl. 1: 238. 1941; Mold., Alph. List Inv. Names 18. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 46, 49, 51--53, 72, 84, & 90. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 561. 1946; Mold., Alph. List Cit. 1: 4, 15, 17, 54, 67, 70, 72, 79, 198, 210, & 254. 1946; Glover, Prov. Check List Brit. Ital. Somal. 266. 1947; H. N. & A. L. Mold., Pl. Life 2: 50 & 69. 1948; Mold., Alph. List Cit. 2: 422, 578, & 607 (1948), 3: 705, 756, 770, 774, & 795 (1949), and 4: 986, 1018, 1047, 1049, & 1065. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 110, 116, 120, 123, 158, 181, 182, & 214. 1949; Mold., Biol. Abstr. 26: 185. 1952; Mold. in Humbert, Fl. Madag. 174: 148, 163--166, 266, & 267, fig. 35 (1 & 2). 1956; Synge in Chittenden, Roy. Hort. Soc. Dict. Gard., ed. 2, 1: 504 & 505. 1956; Mold., Résumé 135, 144, 146, 150, 155, 216, 260, 264, 266, 272, & 450. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 561. 1960; Dale & Greenway, Kenya Trees Shrubs 582. 1961; Hansford, Ann. Myc., ser. 2, Beih. 2: 690. 1961; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 799. 1962; Mold., Résumé Suppl. 3: 28. 1962; H. Huber in Hutchins. & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 440 & 442. 1963; Malaviya, Proc. Indian Acad. Sci. B.58: 352, 357, & 358. 1963; Sharma & Mukhopadhyay, Journ. Genet. 58: 359 & 362. 1963; Mold., Résume Suppl. 11: 6. 1964; A. R. Rees, Journ. Ecol. 52: 9--17. 1964; Anon., Ind. Bibliogr. Bot. Trop. 2 (2): 23. 1965; Backer & Bakh., Fl. Java 2: 607. 1965; Burkill, Dict. Econ. Prod. Malay Penins. 1: 589. 1965; A. R. Rees, Hort. Abstr. 35: 161. 1965; Greensill, Trop. Gardening 105 & 123. 1966; Mold., Résumé Suppl. 13: 4 (1966) and 15: 7. 1967; Van Steenis-Kruseman, Fl. Males. Bull. 4: 1348 & li. 1967; Corder & Watanabe, Illust. Guide Trop. Pl. 754. 1969; Mold., Resumé Suppl. 18: 9. 1969; Van der Pijl, Princip. Dispers. Higher Pl., ed. 1, 50. 1969; Gillett, Numb. Check-list Trees Kenya 46. 1970; Mold., Fifth Summ. 1: 221, 235, 240, 251, 259, 260, 358, 440, 447, & 462 (1971) and 2: 867. 1971; C. D. Adams, Flow. Pl. Jamaic. 636, 794, & 809. 1972; A. L. Mold., Phytologia 23: 319. 1972; Van der Pijl, Princip. Dispers. Higher Pl., ed. 2, 50 & 155. 1972; Mold., Phytologia 28: 445 & 448 (1974) and 34: 261. 1976; Isaacson, Flow. Pl. Ind. 1: 335. 1979; Mold., Phytol. Mem. 2: 204, 212, 225, 230, 240, 248, 249, 267, 306, 349, 386, 392, & 538. 1980; H. N. & A. L. Mold. in Dassan. & Fosb., Rev. Handb. Fl. Ceyl. 4: 411 & 425--426. 1983; Mold., Phytologia 57: 34, 37, 337, & 339 (1985),

58: 185 & 197 (1985), 59: 260 & 486 (1986), and 60: 138. 1986.

Illustrations: Patermann, Beitr. Zytol. Verbenac. pl. 4, fig. 39, & pl. 5, fig. 1. 1935; Mold. in Humbert, Fl. Madag. 174: 165, fig. 35 (1). 1956; Greensill, Trop. Gardening 105. 1966.

An erect or spreading shrub or subshrub, 0.4--2 m. tall, or small tree to 3 m. tall, or often subherbaceous with a woody rhizome, much-branched; branches and branchlets rather slender, very obtusely tetragonal or subterete, grayish, lenticellate, scabrous, striate, glabrous or subglabrate; twigs slender, often brunnescent in drying, glabrate; modes more or less annulate; principal internodes 1--9.5 cm. long or often even more abbreviated on short twigs; leaves decussate-opposite or ternate, abundant, short-petiolate; petioles very slender, 3--15 mm. long, glabrate, often obscure, mostly brunnescent or nigrescent in drying; leaf-blades membranous, dark-green above, fragile and mostly brunnescent or nigrescent above in drying, lighter beneath, broadly lanceolate, oblanceolate, or elliptic to obovate-elliptic or oblanceolate-oblong, 3--14 cm. long, 0.8--5 cm. wide, apically acuminate to long-acuminate, basally gradually attenuate, marginally coarsely serrate-dentate or incised-pinnatifid, varying to shallowly sinuate, from about the middle to the apex, sometimes entire, basally usually decurrent into the petiole, practically glabrous on both surfaces or rarely very obscurely pulverulent, sometimes finely pubescent when young, shiny on both surfaces, the venation simply pinnate, scarcely prominulent and only sparingly reticulate; inflorescence mostly terminal, but some of the cymes also axillary in the uppermost leaf-axils, often sessile or subsessile and umbelliform to capitate, many-flowered, dense, usually 1--4.5 cm. long exclusive of the corollas, the individual cymes mostly 3-flowered and short-stipitate; peduncles obsolete or to about 1.5 cm. long, tetragonal, nigrescent, glabrous; foliaceous bracts often present, a single pair at the apex of the peduncle, oblong-lanceolate, resembling the leaves in all respects but only to 3 cm. long and 8 mm. wide, longer than the calyx; bractlets linear, 2--5 mm. long, nigrescent, glabrous; flowers fragrant, caducous; calyx campanulate-obconic or deltoid, mostly green, basally reddish, nigrescent in drying, mostly 2--5 mm. long, rarely to 7 mm. long, glabrous, the tube infundibular, the rim 5-dentate or -lobed, the teeth or lobes lanceolate or deltoid, unequal, mostly about 2 and 2.5 mm. long, apically attenuate-acuminate; corolla hypocrateriform, somewhat irregular, decidedly inrolled before maturity, white or rosy-white, its tube cylindric, slender, greatly elongate, 6--16 cm. long when fully developed, straight or curved "like a gooseneck (fide Goldsmith), 1--3 mm. wide, slightly contracted beneath the limb, externally very obscurely pilosulous or (usually) subglabrate to glabrous, the limb abruptly expanded, oblique, subbilabiate, 2--3 cm. wide, the lobes broadly elliptic, tinged or spotted with violet-purple, to 1.5 cm. long, the 2 upper ones narrower and shorter, not reaching to the base of the limb, glabrous on both surfaces; stamens long-exserted, involute in bud, surpassing the corolla-mouth by about 5 cm. at full anthesis; filaments red or violet-purple to wine-color (at least apically), often basally white, flattened, glabrous; anthers oblong or ovoid, about 2 mm. long, wine-color or purple, the connective

violet-purple; style long-exserted, apically purple or violet-purple, basally white, surpassing the stamens by 1--2.5 cm., glabrous; stigma bifid, the branches 2--3 mm. long; fruiting-calyx shallowly cupuliform, incrassate, to about 8 mm. wide, glabrous, brunnescent or nigrescent, the rim 5-lobed, the lobes lanceolate, 1--2 mm. long, apically acuminate; fruit drupaceous, very fleshy, globose, orange, about 1.5 cm. long and wide, the endocarp hard and bony.

Clerodendrum incisum, in its typical more glabrous form, occurs from Tanganyika to Mozambique and Madagascar, but varieties occur farther to the north and west. It has been cultivated, also, in Europe, Jamaica, Sri Lanka, and Madagascar. The typical form is based on a Peters collection from Boror, Mozambique.

Collectors have found *C. incisum* growing in sandy areas, on dunes and fertile hillsides, in primeval forests and the shrub layer of coastal forests, in shady places in deciduous forests, along roadsides, and among sandstone pebbles or crowded among limestone rocks, at 100--1000 m. altitude, in flower from November to February, as well as in June, August, and September, and in fruit in April. Goldsmith describes it as "a straggling shrub in well formed *Brachystegia spiciformis* woods", while Torre & Paiva encountered it in the shrubby *Baphia*- and *Bauhinia*-dominated stratum of *Brachystegia* forests in Mozambique. In Madagascar Humbert found it growing in the "rejets de souche dans la prairie periodiquement brulee".

The corollas are described as "white" by Baker (1900) and on *Decary 1390, 1419, 1472, 1492, 1506, & 8012, Drummond & Hemsley 3786, Goldsmith 7/62, Mendonca 3784, Peter 21017,* and *Torre & Paiva 9408,* as "milk-white" by Vatke (1882), as "rosy-white" on *Bernier II.196,* "white, but slightly rosy" on *Perrier 832,* as "white, the lobes spotted with red-purple" on *Humbert 11600,* and "blue" on *Peter 24343.*

The gynoecium morphology is discussed and illustrated by Patermann (1935), while the method of seed dispersal is described by Van der Pijl (1969) as "a placental part of the pericarp adheres as an elaipsome, usually serving for ornithochary".

Adams (1972) reports the species cultivated in Jamaica, where it is called "musical notes".

In regard to its periods of flowering, Rees (1964) found that although there appeared to be a close relationship between heavy rainfall and flowering in Southern Nigeria, it would seem most likely that it is not the rainfall itself, but the drop in temperature which is associated there with rainfall which initiates flowering.

Keys for helping to distinguish *C. incisum* from at least some of its relatives will be found under *C. baronianum* Oliv. (58: 184--190), *C. bethunianum* Low (58: 197--198), and *C. guerkei* J. G. Baker (60: 138) in the present series of notes.

The Madagascar population of *C. incisum* was named *C. lindemuthianum* by Vatke (1882) and his description contains a few terms that do not seem to apply to the continental populations, e.g., the leaf-blades "subcoriaceis....margine subrevolutis, cymis breviter pedipedicellatis laxiusculis in paniculas termianle dispositis..." It was based on *Hildebrandt 3332* from Vavatobé in northwestern Madagas-

car, collected in flower in February, 1880. He comments that "Ut e descriptione patet ad *Siphonanthi* sectionem, J. C. Schauer l.c. 670 pertinet. Exemplaria visa corollae limbum monstruose alte connatum ostendunt. Species dicata cl. Il. Lindemuth, prius in academia poppelsdorfensi horticulturae docenti, jam hortulano regio universitatis berolinensis."

Briquet (1896) named the Madagascar population *C. bernieri*, based on *Bernier 11.196* from northern Madagascar, deposited in the Delesset herbarium at Geneva. His description differs somewhat in speaking of the "Folia....apice obtusa, mucronata, marginibus sat regulariter convexis". He comments that "Species insignis omnium *Verbenacearum* corollae tubo longissimo gaudet. Flores verisimillime inter mirabilissima omnium lepidopterophilorum praestant. Caeterum *C. Bernieri* affinis est *C. Siphonantho* R. Br., a quo praeter corollam, pulchre differt foliorum et calicis forma. Sola species est madagascariensis e sectione *Siphonantho*."

Bakhuizen (1921) also refers to the leaf-blades as "subcoriaceous above the middle, finally pubescent on both sides, especially on the nerves". It seems apparent that he is here referring not to the species proper, but to its var. *macrosiphon* (Hook. f.) J. G. Baker.

Cufodontis (1962) regards *C. macrosiphon* Hook. f. as a synonym not worthy of infraspecific designation, but Hooker's plant has pubescent branches, calyx, and corolla-tube, while typical *C. incisum* has these parts glabrous. He cites only the Peters type collection.

Thomas (1936) also places Hooker's binomial in synonymy. He cites the type and another Peters collection from Mozambique and *Holtz 453*, *Schlieben 5260*, and *Stuhlmann 6126 & 6639* from Tanganyika. I regard the Schlieben collection as representing var. *macrosiphon*. He comments that "Der Typus leg. Peters hat entgegen der Klotzschen Priginalbeschreibung behaarten Kelch und auch vereinzelt behaarte Stengel. Infolgedessen fällt *C. macrosiphon*, der sich nur durch Behaarung von *C. incisum* abheben sollte, mit diesem zusammen; die Stärke der Behaarung ist selbst an einem Exemplar sehr vechselnd."

It should be noted, in passing, that Thomas (1936) mis-cites the original Klotzsch description as "1862", whereas it was actually published in 1861. It is also worth noting that the *Baron 5460* specimen in the Kew herbarium is mounted on the same sheet as *Baron 6889*, but the latter represents *C. mirabile* J. G. Baker.

Baker (1900) cites only *Hildebrandt s.n.* from Kenya, *Holst 2954* from Tanganyika [which I regard as var. *longipedunculatum* Thomas], and *Peters s.n.* from Mozambique and the Kerimba Islands. Huber (1964) cites *Kennedy 1420 & 2640* from Southern Nigeria, commenting that the species is "Distributed from Somalia to Mozambique; probably only introduced in our area [west tropical Africa]".

Material of *C. incisum* has been misidentified as *C. glabratum* Gürke, *C. incisum* var. *macrosiphon* (Hook. f.) J. G. Baker, *Vernonia oxyphylla* DC., and *Rubiaceae*. On the other hand, the *Peter 42178*, distributed as *C. incisum*, seems to be *C. discolor* (Klotzsch) Vatke, *Holst 2954* is *C. incisum* var. *longipedunculatum* Thomas and *Amaratunga 344 & 1318*, *Collector undetermined s.n.* [Roy. Bot. Gard. Peradeniya], *Moldenke, Moldenke, & Jayasuriya 28156*, and *Schlieben 5260* are *C. incisum* var. *macrosiphon* (Hook. f.) J. G. Baker.

Citations: TANZANIA: Tanganyika: A. *Peter 14883* [O.III.232] (B, B), *21008* [O.IV.198] (B, B), *21017* [O.IV.198] (B, B), *24036* [O.IV. 317] (B), *24140* [O.IV.319] (B), *24343* [O.IV.327] (B), *51870* [Busse 1004] (B). KENYA: *Drummond & Hemsley 3786* (B, S). MOZAMBIQUE: Manica e Sofala: *Andrada 1011* (Ul, Ul); *Garcia 218* (Ul), *281* (Ul); *Goldsmith 7/62* (Ul); F. A. *Mendonça 3678* (Ul), *3784* (Mu, Ul); *Salbany 105* (Ld, Ul); *Torre & Paiva 8408* (Ul). Quelimane: *Faulkner KEW.123* (Le, N, N, S). NOSY-BE ISLAND: *Boivin s.n.* [Fevr. 1851] (P). MADAGASCAR: *Afzelius s.n.* [14.5.1912] (N), *s.n.* [13.1.1913] (S); *Baron 2787* (P), *5216* (P), *5460* (K, P), *6450* (P), *6647* (P); *Bernier II.196* (E--photo, F--photo, Ld--photo, N--photo, P), *II.329* (P); *Boivin s.n.* [1847-1852] (P); *Brydorf s.n.* [24/2/1967] (Gz); *Decary 1390* (P), *1413* (P), *1419* (P), *1456* (N, P), *1472* (P), *1492* (P), *1506* (P), *8012* (P); *Grandidier s.n.* [Oct. 1869] (P); *Hildebrandt 3332* (E--photo, F--photo, K, Ld--photo, N--photo, P); *Humbert 11214* (P), *11600* (P); *Kaudern s.n.* [Majunga, V.1912] (S); *Perrier 832* (P, P), *837bis* (P), *10208* (P), *10286* (N, P); *Petit II.20* (P); *Poisson II.7l* (P); *Service Forestier 101* (P). CULTIVATED: Madagascar: *Seyrig 36* (P).

CLERODENDRUM INCISUM var. *AFZELII* Mold., Amer. Journ. Bot. 38: 325. 1951.

Bibliography: Mold., Amer. Journ. Bot. 38: 325. 1951; Mold., Biol. Abstr. 26: 185. 1952; Mold. in Humbert, Fl. Madag. 174: 148, 166, & 267. 1956; Mold., Resume 155 & 450. 1959; Mold., Fifth Summ. 1: 260 (1971) and 2: 867. 1971; Mold., Phytol. Mem. 2: 249 & 538. 1980; Mold., Phytologia 58: 185. 1985.

This variety differs from the typical form of the species in having the calyx at time of anthesis about 10 mm. long.

The variety is based on an unnumbered Afzelius collection from Manasoa Tanosy, in the Province of Tuléar, Madagascar, collected on January 13, 1913, and deposited in the Kew herbarium. Thus far it is known to me only from the original collection.

Citations: MADAGASCAR: *Afzelius s.n.* [Manasoa Tanosy, 13.1. 1913] (E--photo of type, F--photo of type, K--type, Ld--photo of type, N--photo of type).

CLERODENDRUM INCISUM var. *LONGIPEDUNCULATUM* Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 78. 1936.

Bibliography: B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 78. 1936; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 49 & 90 (1942) and ed. 2, 116 & 181. 1949; Mold., Résumé 144 & 450. 1959; Mold., Fifth Summ. 1: 235 (1971) and 2: 867. 1971; Mold., Phytol. Mem. 2: 225 & 538. 1980.

This variety differs from the typical form of the species in having the peduncles 2--3 cm. long. The cymes are axillary and the calyx is split almost halfway down, with wide lobes that are glabrous or only sparingly villose.

The variety is based on *Hildebrandt 1911* from the coast of Zanzibar, collected in December 1875 and deposited in the Berlin herbarium, now doubtless destroyed. Thomas (1936) cites also *Holst*

2954 AND *Stuhlmann 7005* FROM Tanganyika.
Citations: TANZANIA: Tanganyika: *Holst 2954* (Mu--1745).

CLERODENDRUM INCISUM var. *MACROSIPHON* (Hook. f.) J. G. Baker ex Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 80 [as "*Clerodendron*"]. 1921; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 78 in syn. 1936; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 72 & 90. 1942.

Synonymy: *Clerodendron macrosiphon* Hook. f., Curtis Bot. Mag. 109 [ser. 3, 39]: pl. 6695. 1883.[not *C. macrosiphon* (Baker) Pieper, 1928]. *Clerodendron macrosiphon* Hook. ex Gürke in Engl., Pflanzenw. Ost-Afr. C: 340. 1895. *Cyclonema macrosiphon* Wigman, Teysmannia 23: 286 in syn. 1912. *Clerodendrum macrosiphon* Hook. apud B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 78 in syn. 1936. *Clerodendrum incisum* var. *macrosiphon* Baker apud B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 78 in syn. 1936.

Bibliography: Hook. f., Curtis Bot. Mag. 109 [ser. 3, 39]: pl. 6695. 1883; "W. W.", Garden 42: 563. 1892; Bois, Dict. Hort. 1: 334. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 561. 1893; Gürke in Engl., Pflanzenw. Ost-Afr. C: 340. 1895; J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 308. 1900; Koord. & Valet., Meded. Lands Plant. Bat. 42 [Beijdr. Booms. Java 7]: 164. 1900; Woodrow, Gard. Trop., ed. 1 [Gard. India, ed. 6, imp. 8], 438. 1910; Wehmer, Pflanzenst. 1: 648. 1911; Wigman, Teysmannia 23: 284/285 & 286, fig. 5. 1912; Backer, Tropische Natuur 5: 87. 1916; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 80. 1921; Beumee, Tropische Natuur 17: 176. 1928; Wehmer, Pflanzenst. 2: 1024. 1931; Grey & Hubbard, List Pl. Atkins Inst. 59. 1933; Burkill, Dict. Econ. Prod. Malay Penins., imp. 1, 1: 589. 1935; H. F. MacMill., Trop. Plant. Gard., ed. 4, 104. 1935; Schimp. & Faber, Pflanzen-Geogr., ed. 3, 1: 393. 1935; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 78 & 94. 1936; Mold., Geogr. Distrib. Avicenn. 37. 1939; Mold., Lilloa 4: 331. 1939; Mold., Prelim. Alph. List Inv. Names 21. 1940; Worsdell, Ind. Lond. Suppl. 1: 238. 1941; Mold., Alph. List Inv. Names 18. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 72 & 90. 1942; H. F. Mac,Mill., Trop. Plant. Gard., ed. 5, imp. 1, 104 (1943) and ed. 5, imp. 2, 104. 1946; Mold., Alph. List Cit. 1: 15, 17, 54, 67, 70, 72, 79, 198, 210, & 254. 1946; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 3, 104. 1948; Mold., Alph. List Cit. 2: 422 & 607 (1948), 3: 705, 756, 770, 774, & 795 (1949), and 4: 986, 1018, 1037, 1049, & 1065. 1949; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 4, 104. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 158 & 182. 1949; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 5, 104 (1952), ed. 5, imp. 6, 104 (1954), and ed. 5, imp. 7, 104. 1956; Synge in Chittenden, Roy. Hort. Soc. Dict. Gard,m ed. 2, 1: 505. 1956; Mold., Resumé 216, 266, & 450. 1959; Hansford, Sydowia Ann. Myc., ser. 2, Beih. 2: 690--691. 1961; Hundley & Ko in Lace, Trees Shrubs Burma, ed. 3, 203. 1961; Willam. & Schubert, Agr. Res. Serv. U. S. Dept. Agr. Tech. Bull. 1234: 236. 1961; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 799. 1962; Harler, Gard. Plains, ed. 4, 159. 1962; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 8, 104. 1962; Mold., Résumé Suppl. 3: 28.

1962; Malaviya, Proc. Indian Acad. Sci. B.58: 352, 357, & 358. 1963; Sharma & Mukhopadhyay, Journ. Genet. 58: 359, 360, 362, 374, 379, & 381, pl. 9, fig. 6. 1963; R. Good, Geogr. Flow. Pl. 202. 1964; Mold., Résumé Suppl. 11: 6. 1964; Backer & Bakh., Fl. Java 2: 607. 1965; Burkill, Dict. Econ. Prod. Malay Penins. 1: 589. 1965; Sen & Naskar, Bull. Bot. Surv. India 7: 40. 1965; Hore & Bose, Bull. Bot. Surv. India 10: 165 & 167--170. 1968; Bolkh., Grif, Matvej., & Zakhar., Chromos. Numb. Flow. Pl., imp. 1, 715. 1969; Corner & Watanabe, Illust. Guide Trop. Pl. 754. 1969; Roy & Bose, Hortic. Sci. 1 (2): 39--44. 1969; Anon., Biol. Abstr. 52: 11335 (1971) and 52 (20): B.A. S.I.C. S.51. 1971; Mold., Fifth Summ. 1: 358 & 450 (1971) and 2: 867. 1971; A. L. Mold., Phytologia 23: 319. 1972; Mold., Phytologia 23: 430. 1972; Bolkh., Grif, Matvej., & Zakhar., Chromos. Numb. Flow. Pl., imp. 2, 715. 1974; Maiti, Pl. Sci. Lucknow 6: 104--105. 1974; Mold., Phytologia 28: 448 (1974) and 34: 261. 1976; "B.J.G.", Biol. Abstr. 65: 3289. 1977; Mold., Phytol. Mem. 2: 306, 349, 392, & 538. 1980; H. N. & A. L. Mold. in Dassan. & Fosb., Rev. Handb. Fl. Ceyl. 4: 411 & 425--426. 1983; Mold., Phytologia 57: 37 & 337. 1985.

Illustrations: Hook. f., Curtis Bot. Mag. 109 [ser. 3, 39]: pl. 6695 (in color). 1883; Wigman, Teysmannia 23: 284/285, fog. 5. 1912; Schimp. & Faber, Pflanzen-Geogr., ed. 3, 1: 393. 1935; Sharma & Mukhopadhyay, Journ. Genet. 58: pl. 9, fig. 6. 1963; Corner & Watanabe, Illust. Guide Trop. Pl. 754. 1969.

This variety differs from the typical form of the species in having the branchlets, calyx, and exterior of the corolla-tube somewhat pilose- (sometimes glandulose-) pubescent.

Collectors and authors describe this plant as an erect bush, undershrub, or slender shrub, 1--2 m. tall, strongly branched, profusely flowering; branchlets slender, gray, subtetragonal, very densely short-pubescent or spreading-puberulent; nodes not annulate; principal internodes 1.5--5 cm. long; leaves decussate-opposite or ternate, usually with small ones in their axils; petioles very slender, 2--15 mm. long or sometimes obsolete, densely short-pubescent; leaf-blades chartaceous, uniformly dark-green on both surfaces, brunnescent or nigrescent in drying, narrowly elliptic or oblanceolate to oblong-lanceolate or oblong-obovate, 3--12.5 cm. long, 1--5 cm. wide, apically acute to long-acuminate, marginally entire (on small leaves) or with 1--4 coarse, widely divergent, and apically acute teeth on each margin near the middle (on larger leaves), the number often not the same on either side, basally attenuate or long-acuminate, very minutely strigillose-puberulent above, more densely puberulent (especially on the larger venation) beneath; Midrib slender, flat above, prominulent and densely puberulent beneath; secondaries very slender, 5--8 per side, arcuate-ascending, usually not extending directly into the marginal teeth, plainly visible above, slightly prominulent beneath; vein and veinlet reticulation very slender, obscure above, the larger parts very slightly prominulent beneath or obscure; inflorescence axillary and terminal; cymes small, few- to many-flowered, dense, subcapitately corymbose, very short-peduncu-late, the flowers extremely large and showy, subsessile, expanding in the evening, falling off the next morning, the cymes after the corollas have fallen off only about 1 cm. long and wide; flower-buds

"with a deflexed apex, comma-shaped" (fide Backer & Bakh.); peduncles very short and sparsely soft-pubescent or obsolete; pedicels rather stoutish, 3--5 mm. long, puberulent; bractlets and prophylla small, linear-setaceous, sparsely short-pubescent or puberulent; calyx 5--6 mm. long, divided to over 1/3 its length; corolla hypocrateriform, white or yellowish-white to greenish-white, the tube 7--13 cm. long, externally thinly pilose or glandular-pubescent, circinnate in bud, later unrolling and elongating rapidly during anthesis, soon deciduous, the limb rather flat, about 3 cm. wide, shallowly 5-lobed, all the lobes directed forward, the median one longest; stamens exserted, pink to red or purple; filaments 5 cm. long; fruiting-calyx coriaceous, campanulate, about 5 mm. long and wide, shiny, prominently venose, the rim sharply 5-lobed with narrow-triangular spreading lobes; fruit drupaceous, at first green, dark-purple when ripe, obovate, about 7 mm. long and 9 mm. wide, conspicuously 4-lobed but usually only 2-seeded, nigrescent in drying, externally glabrate; chromosome number: 2n =30.

This taxon is based on a specimen cultivated in the Royal Botanic Gardens, Kew, and deposited in that herbarium, from seed originally collected by Sir John Kirk at Usaramo, Tanganyika (Tanzania) in 1881 -- not in "Zanzibar" as claimed by MacMillan (1943).

This plant is widely cultivated for ornament outdoors in tropical Asia and America and in greenhouses in Europe and the United States. It is easily propagated by cuttings. Dwarfing may be induced with an appreciable reduction in shoot length and the production of 100% more flowers by application of Cycocel dust or foliar spray. Roy & Bose (1969) were able to initiate flowering only under longdaylight conditions. It is sometimes attacked by the fungus, *Meliola cookeana* var. *viticis* Hansf. as recorded by Hansford (1961) from Java (based on *BO.11728*) and Malaya (based on *Johnston 1631*).

The absence of stone-cells in this plant was verified by Malaviya (1963). Vernacular names listed for it are "glorybower" and "ngayanpadu".

Collectors have encountered the plant in rocky terrain, at 16--310 m. altitude, in flower in January, March, April, June, and August to October, and in fruit in March. Backer & Bakhuizen (1965) assert that in Java it blossoms intermittently throughout the year. Amaratunga found it growing, apparently wild (escaped), along roadsides in Sri Lanka. Schlieben refers to it as an "abundant herb, 20--60 cm. tall" in Tanzania. Sen & Neskar (1965) record it as cultivated in India; Backer & Bakhuizen (1965) list it from Java gardens; Burkill (1966) found it in cultivation in Malaya. Hundley & Ko (1961) report it as native to Zanzibar and cultivated in Burma; Corner & Watanabe (1969) include it among plants in common cultivation in tropical gardens; Grey & Hubbard (1933) list it as cultivated in Cuba from seed collected by E. F. Atkins in Florida in March 1917, while the unnumbered Fennell collection (cited below) was taken from plants grown in Florida from cuttings made by Walsingham in Cuba. Rimaldo & Pancho assert that the plant is "rare in the Philippines, recently introduced".

The corollas are described as "white" by Woodrow (1910) and by

Corner & Watanabe (1969) and on *Amaratunga 344*, *Jiménez 4603*, *Nur s. n.*, *Pancho 1063*, *Rimaldo & Pancho 76*, and *Schlieben 5260*, "pure-white" on *Fennell s.n.* and *Hort. Kew. s.n.*, "creamy-white"on *Moldenke, Moldenke, & Jayasuriya 28156*, "white or yellowish-white" on *Pancho 2069*, and "greenish-white" on *Mejía & Zanoni 6743*.

Pancho describes the inflorescences as "many-flowered, crowded, lateral umbels". Fennell refers to the leaf-blades as "notched or pinnatifid" and the cymes terminal.

The chromosome number is reported by Sharma & Mukhopadhyay (1963) as 2n = 30. Maiti (1974) discusses the technique of regeneration of terminal greenwood cuttings with the use of Seradix B_1 in auto-humid chambers. Wehmer (1911) asserts that there are some alkaloids present in the leaves.

It should be noted, in passing, that the *Clerodendron macrosiphon* (Baker) Pieper, referred to in the synonymy (above) is a synonym of *Clerodendrum thomasii* Mold., which see. It may also be mentioned that Thomas (1936) mis-cites the Bakhuizen (1921) reference to *C. incisum* var. *macrosiphon* as page "79" instead of page 80.

This variety is regarded as synonymous with typical *C. incisum* Klotzsch by Cufodontis (1962) and by Thomas (1936) -- the latter author asserts that glabrous and pubescent material can be found on the same plant. Yet, after examination of a large series of specimens, I must report that the extremes are certainly quite noticeably different. Perhaps, in view of Thomas' statement, the pubescent form (*macrosiphon*) should be demoted to form, rather than varietal rank.

Material of *C. incisum* var. *macrosiphon* has been distributed widely in herbaria as typical *C. incisum* Klotzsch, as well as *C. indicum* (L.) Kuntze. On the other hand, it seems that *Peter 14883, 21008, 21017, 24036, 24140,* & *24343,* distributed as var. *macrosiphon,* are better regarded as typical *C. incisum* Klotzsch.

Citations: TANZANIA: Tanganyika: *Schlieben 5260* (B, Br, Mu, N, S), *5260a* (B). SRI LANKA: *Amaratunga 344* (Pd), *1318* (Pd). PHILIPPINE ISLANDS: Luzon: *Rimaldo & Pancho 76* (Ba). CULTIVATED: Burma: *C. E. Parkinson 14460* (K). Cuba: *J. G. Jack 5326* (A, B, N, P, W--1476478). Dominican Republic: *J. J. Jimenez 4603* (W--2519407); *Mejía & Zanoni 6743* (N). England: *Herb. Kew. s.n.* [May 19, 1882] (K--type). Florida: *Atkins s.n.* [March 1917] (N); *Fennell s.n.* [Pl. Introd. 90871; PQCA.013073] (Ar--17073, Ba). Federated Malay States: *Foxworthy 4905* (K). India: *Bourne s.n.* [Madras, 14 Nov. 1900] (K). Jamaica: *L. H. Bailey 737* (Ba, Ba, Ld--photo, N--photo); *P. Browne s.n.* (Ld--photo, N--photo); *Mandeville 206* (Ba). Java: *Bakhuizen 2274* (Ut--24897A); *H. Hallier C.33* (Le); *Herb. Hort. Bot. Bogor. XI.G.6a* (Bz--19379, Bz--19380), *XV.K.A.XLVI.20* (Bz--26471, Bz--26472, N). Netherlands: *Herb. Mus. Bot. Haun. P.1912/352* (Cp). New York: *N. Taylor s.n.* [N. Y. BOT. GARD. Cult. Pl. 3291] (N, N). Philippine Islands: *Pancho 1063* (Ba). Singapore: *Nur s.n.* [10 March 1925] (Ba). Sri Lanka: *Collector undetermined s.n.* [Roy. Bot. Gard. Perad., July 1889] (Pd); *Moldenke, Moldenke, & Jayasuriya 28156* (Ld, Pd, W--2764420). Tobago: *W. E. Broadway 2444* (Ed, K), *s.n.* [Oct. 10, 1912] (Cb, Cb, E--703077, G, G, Le, N, P, P, S, W--759443, W--1177971). MOUNTED ILLUSTRATIONS: Corner & Watanabe, Illust. Guide Trop. Pl.

754. 1969 (Ld); H. N. Moldenke color slides 476 (Ld).

CLERODENDRUM INCISUM var. *PARVIFOLIUM* Mold., Phytologia 3: 407. 1951.

Bibliography: Mold., Phytologia 3: 407. 1951; Mold. in Humbert, Fl. Madag. 174: 148, 165, 166, & 267, fig. 35 (2). 1956; Mold., Résumé 155 & 450. 1959; Mold., Fifth Summ. 1: 260 (1971) and 2: 867. 1971; Mold., Phytol. Mem. 2: 249 & 538. 1980; Mold., Phytologia58: 185. 1985.

Illustrations: Mold. in Humbert, Fl. Madag. 174: 165, fig. 35 (2). 1956.

This variety differs from the typical form of the species in having its leaf-blades only 1--3 cm. long and 4--10 mm. wide during full anthesis.

The variety is based on *Humbert 12741* from Mount Vohitrosy in the lower valley of the Mandrare near Anadabolava, Madagascar, at 800--850 m. altitude, collected in December of 1933 and deposited in the Paris herbarium. Thus far it is known to me only from the original collection.

Citations: MADAGASCAR: *Humbert 12471* (Ld--photo, N--fragment of type, N--photo of type, P--type, P--isotype).

CLERODENDRUM INCISUM var. *VINOSUM* Chiov., Fl. Somala 2: 364, fig. 208 [as "*Clerodendron*"]. 1932; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 78. 1936.

Synonymy: *Clerodendron incisum* var. *vinosum* Chiov., Fl. Somala 2: 364, fig. 208. 1932.

Bibliography: Chiov., Fl. Somala 2: 364, fig. 208. 1932; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 78. 1936; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 571. 1941; Worsdell, Ind. Lond. Suppl. 1: 238. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 46, 49--51, & 90. 1942; Glover, Prov. Check List Brit. Ital. Somal. 266. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 110, 116, 120, & 182. 1949; Mold., Résumé 135, 144, 150, & 450. 1959; Cut., Bull. Jard. Bot. Brux. 32: Suppl. 799. 1962; Mold., Fifth Summ. 1: 213, 235, & 251 (1971) and 2: 867. 1971; Mold., Phytol. Mem. 2: 204, 225, 240, 386, & 533. 1980; Mold., Phytologia 57: 34. 1985.

Illustrations: Chiov., Fl. Somala 2: 364, fig. 208. 1932.

This variety differs from the typical form of the species in having its leaf-blades regularly suffused with red.

It is based on *Senni 541* from Licchitore in Transjuba (Oltregiuba), Somalia, collected on July 22, 1929, and deposited in the Florence herbarium.

Thomas (1936) cites, in addition to the type collection, *Busse 1004* and *Engler s.n.* from Tanganyika and *Schlechter 12078* from Mozambique. Cufodontis (1962) lists the variety from southeastern Ethiopia.

Nothing further is known to me of this plant.

CLERODENDRUM INDICUM (L.) Kuntze, Rev. Gen. Pl. 2: 508 [as "*Clerodendron*"]. 1891; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 4 & 90. 1942.

Synonymy: *Lysimachia indica* Bondt, Hist. Nat. Med. Ind. Orient. 159--160 [as "*Lysimachio indico*"]. 1658. *Siphonanthemum* Amman, Comment. Acad. Sci. Imp. Petrop. 8: [Quinq. Nov. Pl. Gen.] 213--215, pl. 15. 1736. *Siphonanthus indica* L., Sp. Pl., ed. 1, imp. 1, 1: 109. 1753. *Ovieda mitis* L., Sp. Pl., ed. 2, 2: 889. 1763. *Siphonant. indica* Amm. ex L., Mant. Pl. 331. 1767. *Ovieda mitis* Burm. ex Scop., Introd. Hist. Nat, 171. 1777. *Ovieda foliis lanceolatis subrepandis* Burm. ex Gaertn., Fruct. Sem. Pl. 1: 272 in syn. 1788. *Montalbania* Neck., Elem. 1: 271. 1790. *Lysimachii species* Pison. ex Lam., Encycl. Meth. Bot. 1: 318 in syn. 1791. *Siphonanthus indica* Raeusch., Nom. Bot., ed. 3, 36. 1797. *Siphonanthus angustifolia* Willd. in L., Sp. Pl., ed. 4, 1 (2): 606. 1798. *Clerodendron siphonanthus* R. Br. in Ait., Hort. Kew., ed. 2, 4: 65. 1812. *Clerodendrum siphonanthus* H. K. ex Desf., Tabl. Ecol. Bot., ed. 2, 64, 1815. *Clerodendron longicolle* G. F. W. Mey., Prim. Fl. Esseq. 217. 1818 [not *C. longicollis* Borgesen & Paulsen, 1959]. *Siphonanthus indicus* L. apud Steud., Nom. Bot. Phan., ed. 1, 578 in syn. 1821. *Clerodendrum siphonanthus* Ait. ex Steud., Nom. Bot. Phan., ed. 1, 782 in syn. 1821. *Siphonanthus indica* var. *angustifolia* Poir. ex Steud., Nom. Bot. Phan., ed. 1, 782 in syn. 1821. *Clerodendrum longicolle* Meyer apud Steud., Nom. Bot. Phan., ed. 1, 207. 1821. *Ovieda verticillata* Roxb. ex D. Don, Prodr. Fl. Nepal. 102 in syn. 1825. *Clerodendrum verticillatum* (Roxb.) D. Don, Prodr. Fl. Nepal. 102. 1825. *Clerodendron longicolla* Mey. apud Spreng. in L., Syst. Veg., ed. 16, 2: 758. 1825. *Clerodendrum verticillatus* D. P. ex Sweet, Hort. Brit., ed. 1, 1: 322. 1826. *Clerodendrum verticillatum* D. Don apud Loud., Hort. Brit., ed. 1, 247. 1830. *Ovieda siphonanthus* Roxb. ex Wall., Numer. List 86, no. 1784F. 1831. *Clerodendrum siphonanthus* R. Br. apud Bojer, Hort. Maurit. 255. 1837. *Clerodendron siphonanthus* Spreng. ex J. Grah., Cat. Pl. Bomb. 157. 1839. *Ovieda inermis* Burm. ex Steud., Nom. Bot. Phan., ed. 2, 383 in syn. 1840 [not *O. inermis* (L. f.) Baill., 1891, nor Retz., 1772]. *Clerodendron siphonanthus* β *angustifolium* Hassk., Flora 25: Beibl. 27. 1842. *Clerodendron fortunatum* Blume ex Hassk., Flora 25: Beibl. 27 in syn. 1842 [not *C. fortunatum* Blanco, 1837, nor Buch.-Ham., 1831, nor Burm., 1962, nor L., 1756, nor Sesse & Moc.,1894, nor Wall., 1885]. *Clerodendron angustifolium* (Willd.) Hassk., Cat. Pl. Hort. Bogor. Cult. 136. 1844. *Siphonanthus indica* Willd. ex Schau. in A. DC., Prodr. 11: 670 in syn. 1847. *Siphonanthus indica* Lam. ex Roxb., Fl. Indica, ed. 2, imp. 2, 481. 1874. *Clerodendron mite* (Burm.) Vatke, Linnaea 43: 537. 1882 [not *C. mite* Vahl, 1931]. *Clerodendron verticillatum* Don ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 595 in syn. 1885. *Clerodendron indicum* (L.) Kuntze, Rev. Gen. Pl. 2: 506. 1891. *Clerodendron mite* Vatke apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 561. 1893. *Ovieda inermis* Burm. f. ex Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 386 in syn. 1894 [not *O. inermis* (L. f.) Baill., 1891, nor Retz., 1772]. *Ovieda verticillatum* Roxb. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 386 in syn. 1894. *Clerodendron indicum* Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 101 in syn. 1901. *Clerodendron siphonanthus* Ait. apud Wigman, Teysmannia 23: 279. 1912. *Clerodendron siphonanthus* (R. Br.) Ait. ex Wigman, Teysmannia 23: 288. 1912. *Clerodendron*

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1, imp. 1, 101. 1901; Koord., Teysmannia 12: 26--30. 1901; Boorsma, Bull. Inst. Bot. Buitenz. 14: 35. 1902; Gamble, Man. Indian Timb., ed. 2, imp. 1, 543. 1902; Millsp., Field Columb. Mus. Publ. Bot. 1: 524. 1902; Prain, Beng. Pl., imp. 1, 835 & 836. 1903; C. B. Clarke in Schmidt, Bot. Tidsskr. 26: 173. 1904; F. N. Williams, Bull. Herb. Boiss., ser. 2, 5: 432. 1905; Baerecke, Anal. Key Ferns Flow. Pl. Atl. Sect. Middl. Fla. 115. 1906; Brandis, Indian Trees, imp. 1 & 2, 508. 1906; T. Cooke, Fl. Presid. Bomb., ed. 1, 3: 433. 1906; Duthie in Strachey, Cat. Pl. Kumaon 138. 1906; Brandis, Indian Trees, imp. 2a, 508. 1907; Gamble in King & Gamble, Journ. Asiat. Soc. Beng. 74 (2 extra): 826 & 839--840. 1908; Talbot, For. Fl. Bomb., ed. 1, 2: 360. 1909; Haines, For. Fl. Chota Nagpur 484 & 486. 1910; Woodrow, Gard. Trop., ed. 1 [Gard. India, ed. 6, imp. 8], 438. 1910; Brandis, Indian Trees, imp. 3, 508. 1911; Duthie, Fl. Upper Gang. Plain 2: 225 & 227. 1911; Gerth van Wijk, Dict. Plantnames, imp. 1, 1: 335. 1911; Ridl., Journ. Roy. Asiat. Soc. Straits 59: 156. 1911; Wehmer, Pflanzenst., ed. 1, 648. 1911; J. C. & M. Willis, Rev. Cat. Flow. Pl. Ceyl. [Perad. Man. Bot. 2:] 143. 1911; Koord., Exkursionsfl. 3: 137. 1912; J. Matsumura, Ind. Pl. Jap. 2 (2): 532. 1912; Wigman, Teysmannia 23: 279, 282, 284/285, & 288, fig. 9. 1912; Druce, Rep. Bot. Exch. Club Brit. Isls. 3: 416. 1914; P. C. Standl., Torreya 14: 21--24. 1914; Boorsma, Tropische Natuur 4: 140. 1915; Backer, Tropische Natuur 5: 88 & 94. 1916; Gerth van Wijk, Dict. Plantnames, imp. 1, 2: 1517. 1916; Heyne, Nutt. Plant. Ned. Ind., ed. 1, 4: 122 & xxiii. 1917; Basu, Indian Med. Pl., imp. 1, 3: pl. 747. 1918; Boorsma, Teysmannia 29: 328. 1918; N. L. Britton, Fl. Bermuda 320. 1918; Firminger, Man. Gard. India, ed. 6, 2: 387. 1918; H. Hallier, Meded. Rijks Herb. Leid. 37: 77. 1918; R. N. Parker, For. Fl. Punjab, ed. 1, 400--402. 1918; H. J. Lam, Verbenac. Malay. Arch. 306, 363--365, & 371. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 75, 85, 108--110, & viii--x. 1921; Brandis, Indian Trees, imp. 4, 508. 1921; Hubert, Trav. Lab. Mat. Méd. Pharm. 13: [Verb. Util. Mat. Méd.] 105. 1921; Prain, Ind. Kew. Suppl. 5, imp. 1, 62. 1921; Gamble, Man. Indian Timb., ed. 2, imp. 2, 543. 1922; Haines, Bot. Bihar Oris., ed. 1, 4: 720 & 722. 1922; Rodger in Lace, List Trees Shrubs Burma, ed. 2, 133. 1922; E. D. Merr., Enum. Philip. Flow. Pl. 3: 406. 1923; Ridl., Fl. Malay Penins. 2: 624 & 628--629. 1923; Gamble, Fl. Presid. Madras 6: 1099 & 1100. 1924; R. N. Parker, For. Fl. Punjab, ed. 2, 400--401. 1924; Bodding, Mem. Asiat. Soc. Beng. 10: 6, 63, & 81. 1925; Britton & P. Wils., Scient. Surv. Porto Rico 6: 151. 1925; H. F. MacMillan, Trop. Plant. Gard., ed. 1, 207 & 550. 1925; Bodding, Mem. Asiat. Soc. Beng. 10: 206, 227, 228, 244, 253, & 275. 1927; Heyne, Nutt. Plant. Ned. Ind., ed. 2, 1: 24 (1927) and ed. 2, 2: 1322. 1927; Osmaston, For. Fl. Kumaon 411 & 413. 1927; Freemna & Williams, Useful Pl. Trin. 44. 1928; P. C. Standl., Torreta 14: 22. 1929; Stapf, Ind. Lond. 4: 502. 1930; Alston in Trimen, Handb. Fl. Ceyl. 6 Suppl. 232--233. 1931; Anon., Agric. Res. Serv. U. S. Dept. Agr. Tech. Bull. 1234. 1931; Kudô, Iconogr. Trop. Pl. Taiwan 2: pl. 9. 1931; Stapf, Ind. Lond. 6: 134. 1931; Wehmer, Pflanzenst. 2: 1024. 1931; P'ei, Mem. Sci. Soc. China 1 (3): 123 & 125--127. 1932; Rehnelt, Pareys Blumengärt., ed. 1, 281. 1932; G. Klein, Handb. Pflanzenal. 4 (1): 794. 1933. [to be continued]

BOOK REVIEWS

Alma L. Moldenke

"DEVELOPMENTAL BIOLOGY OF HIGHER FUNGI" edited by D. Moore, L. A. Casselton, D. A. Wood & J. C. Frankland, xii & 615 pp., 141 b/w multi-fig. incl. 184 photo. & 75 tab. Cambridge University Press, Cambridge & London, U.K. & New York, N. Y.10022. 1985. $99.50.

These 27 well composed papers are from an important symposium of the British Mycological Society at the University of Manchester in 1984. The preface orients readers to consider developmental biology to include "not only structural form -- both vegetative and reproductive -- but also how that form relates to an organism's ecological niche.....Many of the most obvious, and most intellectually challenging, morphogenic features are a direct contribution to ecological performance." Some of the topics presented are: mycorrhizal dynamics during forest tree development, dikaryon formation, developmental characteristics of agarics, biochemistry of *Agaricus* fructification, strategies for mushroom breeding, and biological and technical aspects of commercial mushroom breeding. This book is needed in college and university libraries and fungal breeding and biochemical laboratories.

"EMBRYOGENESIS IN ANGIOSPERMS. A Developmental and Experimental Study" by V. Raghavan, xiii & 303 pp., 33 b/w multi-fig. incl. 75 photo. & 4 tab. Cambridge University Press, Cambridge & London, U.K. and New York, N. Y. 10022. 1986. $39.50.

Herein the author has brought together in synoptic form "the most recent knowledge on the theoretical, developmental and experimental facets of embryogenesis in angiosperms.....using a systems approach based on data from morphology, anatomy, genetics and biochemistry". There are chapters on developmental embryogenesis, its cellular, biochemical, pollen, somatic, experimental and applied aspects and their significances toward some important applications in our agriculture. This study is needed in agricultural, college and university libraries.

"THEORETICAL STUDIES ON SEX RATIO EVOLUTION" by Samuel Karlin & Sabin Lessard, xv & 314 pp., 11 b/w fig. & 11 tab. Princeton University Press, Princeton, New Jersey 08540. 1986. $47.50.

This book is the 22nd of the excellent monographs in Population Biology edited by Robert M. May. It is especially important for those who can follow intelligently all of the many carefully devel-

oped mathematical explanations on sex ratio theory. More than 60% of this material embodies new research. There are several models developed for concepts and parametrization for the 2-3-loci multiallele sex-determining systems and some for incompatibility and haplodiploid mixed parthenogenesis, etc. Gregor Mendel has been identified as "a young mathematician whose statistical interests extended to the physical and biological sciences, who modeled his laws of inheritance to be consistent with his experimental results." This study should be of very real interest to reproductive biologists, ecologists and graduate students. University libraries should surely have this book available.

"THE COMPLETE HANDBOOK OF GARDEN PLANTS" by Michael Wright, 544 pp., 260 multicolor pl., 1 b/w map & 2 tab. Facts on File Publications, Inc., New York, N. Y. 10016. 1984. $18.95.

This book "bespeaks" its text as originally oriented for British gardens (despite its hardiness zone map for the U.S.A), but because of the longtime and widespread horticultural trade, this book should be helpful and delightful to English-reading gardeners the world over and to travelers on now popular horticultural, estate and gardening tours. In this compact size book over 9000 species and varieties are described and over 2500 are illustrated on the lovely 260 color plates. The plants are grouped practically as: evergreen and leafy trees and shrubs, perennial climbers, border and bedding perennials, bulbs, corms, tubers, rock plants, annuals and biennials and water plants. Growing limitations and suggestions are given in the text. Even though the first column of the S's in the index is "irregular", this book is highly recommended especially for accomplishing so much in so small a space.

"SCIENCE AND CIVILIZATION IN CHINA" by Joseph Needham with the collaboration of Lu Gwei-Djen and a special contribution by Huang Hsing-Tsung, Volume 6 Biology and Biological Technology, Part I Botany, xxii & 718 pp., 89 b/w fig. & 22 tab. Cambridge University Press, Cambridge & London, U.K. & New York, N. Y. 10022 1986. $95.00.

And probably the title information would have been even more elongated with articles by Georges Metailie if he had submitted on time his articles on Chinese knowledge of plant processes, horticultural techniques, gardening and the influence of Chinese flora and botany on modern plant sciences. This wonderful historical survey starts with China's plant geography, common and learned names in botanical linguistics from the earliest records forwards, continues with wild food plants, explorations of the borderlands, development of ornamental and pharmaceutical plants, information on crop improvement and natural pest control. Expectedly the three bibliographies are widely collected: (1) Chinese and Japanese books before

1800, (2) those since 1800 and (3) books and journals in Western languages. The general index gives a table of Chinese dynasties and a romanization conversion table. Surely this book -- this series -- belongs in college and university libraries around the world.

"ATLAS OF MARITIME HISTORY" by Richard Natkiel & Anthony Preston, 256 pp., 205 b/w photo., 15 fig. & 356 color-routed maps. Facts on File Publications, Inc., New York, N. Y. 10016. 1986. $29.95.

Why this book was sent to this botanical journal, I cannot guess, but with its many clear line-routed maps, its historically important figures, fine photographs and succintly written and clearly legible text, it is indeed pleasurable and worthwhile to peruse. The introductory chapters on the ancient and the medieval worlds and the age of exploration give botanists opportunities to recall the actual paths of introduction for exotic food, spice, fiber, timber, horticultural and other plants. The other six chapters are war infested up to this present age, but they are also very effectively presented.

"SEVEN CLUES TO THE ORIGIN OF LIFE -- A Scientific Detective Story" by A. G. Cairns-Smith, xii & 131 pp. Cambridge University Press, Cambridge & London, U.K. and New York, N. Y. 10022. 1985. $17.95.

Using the ingenious cover of a Sherlock Holmes-Dr. Watson drawn out question-answer conversation about the origin of life, the author develops seven clues very logically in reasonably clear and simple molecular and chemical terms for the inquiring intelligent layman, discards false leads with typical Holmesian logic and ends up with a clay-making machine whose molecular variations could have produced a naked gene, "a hypothetical minimal primary organism that has no separate phenotype.....Life would have been a later gradual emergence (spontaneous generation) of secondary organisms "through a gradual replacement of a genetic takeover." This carefully worked out theory just seems to go back earlier in the life-out-of-slimy-ooze concept. Very interesting.

"THE ENCYCLOPEDIA OF REPTILES AND AMPHIBIANS" edited by Dr. Tim R. Halliday & Dr. Kraig Adler, iii & 143 & viii--xvi pp., 131 color photo., 1 b/w photo., 16 color fig., 13 b/w fig., 77 color geog. distrib. maps, 10 tab. & 9 comparative size b/w fig. Facts on File Publications, Inc., New York, N. Y. 10016. 1986. $24.95.

A true encyclopedia this is not, but an excellent, really interesting, attractive and beautifully illustrated survey of the world's

major reptiles and amphibians it most surely is with its contributions from 19 experts on all the families of these animals. For amphibians their geological history is surveyed, also their living adaptations for both water and land habitats, and their courtships, leaping and chorusing. For reptiles true dinosaurs are distinguished from archosaurs, temperature regulation is explained by exposure to sun and shade, and the gavial (U.S. dictionaries and genus *Gavialis*) or gharial (Oxford dictionary and Hindi) is shown (photo) in protective padding for transportation for safe release into the wild. This book is emphatically recommended for all public, school, college, and personal libraries of enthusiasts about these creatures.

"THE ENCYCLOPEDIA OF INSECTS" edited by Christopher O'Toole, v & 143 & x--xvi pp., 160 color photo., 3 b/w photo, 1 color map, 78 chart outlines, 14 color draw. & 96 b/w draw. Facts on File Publications, Inc., New York, N. Y. 10016. 1986. $24.95.

Like "The Encyclopedia of Reptiles and Amphibians", this treatise is also not a real encyclopedia, but it is likewise an excellent survey of the world of insects and the insects of the world, as well as a similarly developed section on arachnids and a briefer one on myriapods. This editor and the 21 sectional expert contributors use the phylum name *Uniramia*: they are all functioning experts in their fields who know how to write interestingly and effectively. Beetles get their due as "the most successful group of animals on Earth, forming almost one-third of all described animal species and about two-fifths of all insects". The very excellent color photographs catch dynamic, dramatic poses instead of limp-looking dead things with pins or pin-holes in them. The use of boxed or chart forms for certain information is an effective devise against any tedium in reading all the substantive material in the text. This book also belongs in school, public, college and university libraries as an excellently presented source of information. It should be a stimulating gift for any young person interested in insect life.

"ESCRITOS ETHNOBOTANICOS: Dictamo Afrodisíacos, Plantas Irritantes o Alérgenas, Asma, Mapurite o Anamú, Diabetes" by Santiago López-Palacios, 323 pp. & 24 b/w & 1 color pl. Dep. Botánica y Farmacognosia, Mérida C.P.5101, Venezuela. 1985. Paperbound.

The author, our friend of long standing, has presented a valuable study on a worldwide scale over a long span of time from the literature and especially from South American plant sources. Such information is now of increasingly appreciated importance for furthering pharmaceutical and medical research for more and better disease control. He also stresses that some native medical recommendations are only based on hearsay, that dependence on just the common plant names may not be reliable. A printed slip of corrections of printing errors is included; it caught some but not all of the misspellings. The fullpage plant plate drawings are well done and are particularly

attractive printed in green -- which is so natural for most observable parts of plants.

"SPIDERS OF THE WORLD" by Rod & Ken Preston-Mafham, 191 pp., 66 color pl., 38 b/w pl. & 35 b/w multi-fig. draw. Facts on File Publications, Inc., New York, N. Y. 10016. 1984. $17.95.

This is a very effectively developed and very attractively illustrated survey of both the spiders of the world and the world of spiders. The chapters describe their classification (using the name *Arthropoda* as the phylum designation), courtship and mating (recording some as parthenogenetic), their life histories (with the marvels of web-making and use), prey capturing, defense mechanisms, and their relations with man. The introduction states that "Little Miss Muffet was probably a daughter of a Thomas Muffet, a keen spider enthusiast". The final chapter closes with "spiders and their insect prey are far better equipped for survival in the long term than man himself...., it is certain that spiders will still be laying traps for flies long after man has finally disappeared from the earth".

"THE QUANTUM WORLD" by J. C. Polkinghorne, xi & 100 pp. & 9 b/w fig. Princeton University Press, Princeton, N. J. 08540; (1984 Longman Group Ltd., hardcover) Princeton University Press, 1984. $6.95 paperbound.

The author was a former professor in the department of Applied Mathematics and Theoretical Physics in the University of Cambridge and is now an Anglican clergyman. "Two great discoveries have transformed our view of the natural world. One is Einstein's theory of special relativity; the other is quantum mechanics....much the more revolutionary". He describes somewhat simply and very carefully "a way of thinking about the quantum world....and also the beautiful structure of the microworld which has been laid bare by the discoveries of elementary particle physics".

"CONTROL OF LEAF GROWTH" edited by N. R. Baker, W. J. Davies & C. K. Ong, xii & 351 pp., 81 b/w fig., 2 b/w photo. & 24 tab. Cambridge University Press, Cambridge & London, U.K. & New York, N. Y. 10022. 1985. $39.50.

This neatly typed offset publication is No. 27 in the seminar series of the Society for Experimental Biology and contains 15 papers by 24 authors including the editors. They deal with such topics as: physical limitations of leaf cell expansion, energy transduction, carbon relations in developing leaves, mechanisms of light-stimulating leaf cell expansion, and air pollution and leaf growth with certain compensation mechanisms increasing the relative leaf area

exposed to ozone and sulfur dioxide. The figures on pp. 126 and 322 are particularly well constructed. The last paper, on "The Way Ahead", concludes that "Only by considering the whole plant can we identify the performance criteria which the control mechanisms associated with leaf growth may be trying to satisfy". Although most of the authors are from the British Isles, there is international representation among them.

"TIGER -- Portrait of a Predator" by Valmik Thapar, 200 pp., 175 color & 1 b/w photo. & 2 color maps. Facts on File Publications, Inc., New York, N. Y. 10016. 1986. $24.95.

This is an excellent nature story rendered in effective words and in superb color photography by Günther Ziegler and Fateh Singh Rathore. It "shows and tells" of all phases of tiger life and activities, their prey, and of the other animals and plants that live in the beautiful Ranthambhore preserve with its ancient crumbling fort. Previously the English and maharajahs used to hunt here, causing the surviving tigers to hunt by night, but now they roam freely in daylight. There are appendices (1) locating (Asia), describing (subspp.) and censusing (ca. 7,000) the tigers of the world; (2) listing the mammals, reptiles and birds of this 400 km. forest; and (3) mentioning 450 named plant species and a profusion of insect life. Upon closing this book, I am sure that almost all readers will at least dream of visiting the Ranthambhore Tiger Preserve and will open their pockets for contributions to help the excellent nature conservancy work being performed there.

"SULFUR DIOXIDE AND VEGETATION - Physiology, Ecology, and Policy Issues" edited by William E. Winner, Harold A. Mooney & Robert A. Goldstein, xxi & 593 pp., 148 b/w fig., 74 tab., 2 maps & 8 photo. Stanford University Press, Stanford, California 94305. 1986. $65.00.

"This volume was developed from a symposium held in Alisomar, California in 1982" and consists of 30 papers by 50 contributors. There are 4 papers on pollution management, 7 on sulfur dioxide effects on plant metabolism, 10 on its effects on plant growth, 7 on plant communities, and 2 in summary. It is intended as a reference book for those interested in sulfur dioxide-caused changes in plant physiology and ecology. Sulfur dioxide is only one of several industrial pollutants; it has been playing its destructive role longest and most intensely, as shown on a U.S.A. map on p. 235. Olson and Sharpe provide a rationale for the use of mechanistic mathematical modeling providing "vital links between long-term ecological, whole-plant dose-response, and biochemical mechanism research".This book is needed in agricultural, horticultural and biochemical labs and university libraries.

"GENETIC FLUX IN PLANTS" edited by B. Hohn & E. S. Dennis, xii & 253 pp., 40 b/w fig., 7 tab. & 16 photo. Springer-Verlag, Wien & New York, N. Y. 10010. 1985. $39.00.

This is the second publication in the new Plant Gene Research [for] Basic Knowledge and Application and should be welcomed. Section I deals with movement of genetic information from the environment into the plants by competent and satellite viruses and viroids and of DNA flux across genetic barriers by *Agrobacterium*. Section II covers movement of genetic information between such plant organelles as chloroplasts with mitochondria or with nuclei. Section III has 6 papers on the movement of genetic information within plant organelles with consideration of "the very large and variable size of the genome", repeated DNA sequences, and unstable mutations and chromosome breakage in maize. The last chapter deals with the great amount of somaclonal variation (rather than presupposed uniformity) in tissue culture and gross plant study of several vegetable crop plants. Since this book shows where and how such research is headed and its possible economic applications, it surely belongs in university, college and effected laboratory libraries.

"THE EUROPEAN GARDEN FLORA - A Manual for the Identification of Plants Cultivated in Europe, Both Out-of-Doors and Under Glass": Volume I *Pteridophyta, Gymnospermae, Angiospermae*-Monocotyledons (Part 1) edited by S. M. Walters, A. Brady, C. D. Brickell, J. Cullen, P. S. Green, J. Lewis, V. A. Matthews, D. A. Webb, P. F. Yeo & J. C. M. Alexander, xv & 430 pp., 44 b/w multi-fig. pl. & 1 European hardiness lines map. Cambridge University Press, Cambridge & London, U. K. & New York, N. Y. 10022. 1986. $99.50.

Limited to the huge field of amenity horticulture, this publication and its anticipated Volume II (and III?) on the rest of the monocots and the dicots will prove a great boon for literate owners of and workers in small garden spots to estate lands, from public building grounds to parks, for nurserymen to landscape architects, for conservatory to glass house growing laboratory staff, and for libraries with horticultural identification questions to the laboratory scientists and graduate trainees doing important experimental work on tomorrow's amenity plants with new forms, disease resistance, gene control, etc., and for the staffs of horticultural and mixed herbaria. Over 12,000 kinds of plants are named, fitted into operable keys, described within their families, with blooming times and cultivation tips, by a staff of 33 specialist-contributors. Since horticultural introductions encompass much of the globe, this book is surely destined to be a treasurehouse for English-language readers. It should fulfill an important place in private and public libraries as well as in those of horticultural schools and institutes, colleges and universities. This book is really a very special and valuable publication.